POWER SYSTEMS-II

Course Code	23EE3503	Year	III	Semester	I
Course Category	Professional Core	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Power systems I, Electrical circuit Analysis.
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Understand the basic electrical and mechanical principles of transmission lines, including line parameters, corona, transients, sag, and insulators (L2).
CO2	Apply electromagnetic and electrical principles to determine transmission line parameters and calculate line performance (L3).
CO3	Analyze the effects of various conductor configurations on transmission line parameters and performance (L4).
CO4	Apply corona discharge principles to assess the transmission line performance and also identify the surge and mechanical behavior of transmission lines (L3).
CO5	Analyze the mechanical performance of transmission lines and the transient behavior of different line configurations. (L4).

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2				1					2	3	2
CO2	3	3		3		2					2	3	2
CO3	3	3	2	2		2					2	3	2
CO4	3	3	2			3					2	3	2
CO5	3	3	2	3		2					2	3	2

SYLLABUS		
Unit No.	**Contents**	**Mapped CO**
I	**Transmission Line Parameters Calculations** Conductor materials – Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for Single-phase and Three-phase single and double circuit lines– Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Bundled conductors, Skin and Proximity effects. Calculation of capacitance for 2 wire and 3 wire systems – Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical single and Three-phase single and double circuit lines without and with Bundled conductors.	**CO1, CO2, CO3**

II	**Performance Analysis of Transmission Lines** Classification of Transmission Lines – Short, medium, long lines and their model representation –Nominal-T, Nominal-π and A, B, C, D Constants for symmetrical Networks. Rigorous Solution for long line equations –Representation of Long lines – Equivalent T and Equivalent π network models - Surge Impedance and Surge Impedance Loading of Long Lines - Regulation and efficiency for all types of lines – Ferranti effect.	**CO1, CO2, CO3**
III	**Power System Transients** Types of System Transients – Propagation of Surges – Attenuation–Distortion– Reflection and Refraction Coefficients. Termination of lines with different types of conditions: Open Circuited Line–Short Circuited Line, Line terminated through a resistance and line connected to a cable. Reflection and Refraction at a T-Junction.	**CO1, CO4, CO5**
IV	**Corona& Effects of transmission lines** Description of the phenomenon – Types of Corona - critical voltages and power loss – Advantages and Disadvantages of Corona - Factors affecting corona - Radio Interference.	**CO1, CO4**
V	**Sag and Tension Calculations and Overhead Line Insulators:** Sag and Tension calculations with equal and unequal heights of towers–Effect of Wind and Ice weight on conductor – Stringing chart and sag template and its applications. Types of Insulators – Voltage distribution in suspension insulators–Calculation of string efficiency and Methods for String efficiency improvement – Capacitance grading and Static Shielding.	**CO1, CO4, CO5**

Learning Resources
Text Books:
1. C.L.Wadhwa, "Electrical Power Systems" ,New Age International (P) Limited,8th Edition, 2022. 2. I.J. Nagarath & D.P. Kothari, "Power System Engineering", McGraw-Hill Education, 3rd Edition, 2019.
Reference Books:
1. John J Grainger William D Stevenson, "Power system Analysis",, TMC Companies, 4th edition, 1994 2. B.R.Gupta, " Power System Analysis and Design", Third Edition, A.H. Wheeler and Co Ltd., New Delhi, 1998. 3. M.L.Soni, P.V.Gupta, U.S.Bhatnagar ,A.Chakrabarthy, "A Text Book on Power System Engineering", DhanpatRai Co Pvt. Ltd. 2016. 4. P.S.R. Murthy , "Electrical Power Systems" , B.S. Publications, 2017.
E-Resources: 1. https://archive.nptel.ac.in/courses/108/105/108105104 2. https://archive.nptel.ac.in/courses/108/102/108102047